The Blazar Times

A Research Newsletter Dedicated to the BL Lac and Blazar Phenomena

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Journal Abstracts

The 2QZ BL Lac Survey

D. Londish[1,2], S.M. Croom[2], B.J. Boyle[2], T. Shanks[3], P.J. Outram[3], E.M. Sadler[1], N.S. Loaring[4], R.J. Smith[5], L. Miller[4], P.F.L. Maxted[6,7]

[1] University of Sydney, School of Physics, Sydney NSW 2006, Australia
[2] Anglo-Australian Observatory, PO Box 296, Epping, NSW 1710, Australia
[3] Department of Physics, University of Durham, South Road, Durham, DH1 3LE, UK
[4] Department of Physics, Oxford University, 1 Keble Road, Oxford, OX1 3RH, UK
[5] Liverpool John Moores University, Twelve Quays House, Egerton Wharf, Birkenhead, CH41 1LD, UK
[6] Department of Physics & Astronomy, University of Southampton, Highfield, Southampton SO17 1BJ, UK
[7] Department of Physics, Keele University, Staffordshire, ST5 5BG, UK

We have optically identified a sample of 56 featureless continuum objects without significant proper motion from the 2dF QSO redshift survey (2QZ). The steep number–magnitude relation of the sample, $n(b_{\rm J}) \propto 10^{0.7b_{\rm J}}$, is similar to that derived for QSOs in the 2QZ and inconsistent with any population of Galactic objects. Follow up high resolution, high signal-to-noise, spectroscopy of five randomly selected objects confirms the featureless nature of these sources. Assuming the objects in the sample to be largely featureless AGN, and using the QSO evolution model derived for the 2QZ, we predict the median redshift of the sample to be $z = 1.1$. This model also reproduces the observed number-magnitude relation of the sample using a renormalisation of the QSO luminosity function, $\Phi^* = \Phi^*_{\rm QSO}/66 \simeq 1.65 \times 10^{-8}\,{\rm mag}^{-1}{\rm Mpc}^{-3}$. Only $\sim$20 per cent of the objects have a radio flux density of $S_{1.4} > 3\,$mJy, and further VLA observations at 8.4 GHz place a 5σ limit of $S_{8.4} < 0.2$mJy on the bulk of the sample. We postulate that these objects could form a population of radio-weak AGN with weak or absent emission lines, whose optical spectra are indistinguishable from those of BL Lac objects.

submitted to astro-ph 0202386, Accepted by MNRAS

For preprints contact: dlondish@physics.usyd.edu.au

Supermassive black hole masses of AGNs with elliptical hosts

Xue-Bing Wu[1], F.K. Liu[1] and T.Z. Zhang[1]

[1] Dept. of Astronomy, Peking University, Beijing 100871, China

The recently discovered tight correlation between supermassive black hole mass and central velocity dispersion suggests a possibility to estimate the SMBH mass from the measured central velocity dispersion. However, for most AGNs it is difficult to measure the central velocity dispersions of their host galaxies directly. In this paper we adopt the fundamental plane for ellipticals to estimate the central velocity dispersion and SMBH mass for a number of AGNs with morphology parameters of their elliptical host galaxies obtained by the HST imaging observations. The estimated SMBH masses of 63 BL Lac objects, 10 radio galaxies, 10 radio-loud quasars and 9 radio-quiet quasars are mostly in the range of $10^{7.5} M_{\odot}$ to $10^{9} M_{\odot}$. No significant difference in black hole mass is found for high-frequency peaked BL Lacs and low-frequency peaked BL Lacs, as well as for radio galaxies and radio-loud quasars. The Eddington ratios of radio galaxies are substantially smaller than those of quasars. This suggests that the different observational features of radio-loud AGNs may be mainly dominated by accretion rate rather than by the black hole mass, which is in agreement with some evolutionary scenarios recently proposed for radio-loud AGNs. Different to some previous claims, we found that the derived mean SMBH mass for radio-loud quasars is only slightly larger than that of radio-quiet quasars. Though their SMBH mass distributions are statistically different, their Eddington ratio distributions are probably from the same population. In addition, we noted that the relation between black hole mass and host galaxy luminosity obtained using the fundamental plane provides further arguments for a nonlinear scaling law between SMBH mass and galactic bulge mass.

Accepted by A&A

For preprints contact: wuxb@bac.pku.edu.cn

For preprints via ftp or WWW: http://arXiv.org/abs/astro-ph/0203158

COMPTEL Observations of the Gamma-Ray Blazar PKS 1622-297

S. Zhang[1], W. Collmar[2], K. Bennett[3], H. Bloemen[4], W. Hermsen[5], M. McConnell[6], O. Reimer[7], V. Schönfelder[8], S. J. Wagner[9], and O.R. Williams[10]

[1,2,8] Max-Planck-Institut für extraterrestrische Physik, P.O. Box 1603, D-85740 Garching, Germany
[4,5] SRON National Institute for Space Research, Sorbonnelaan 2, NL-3584 CA Utrecht, The Netherlands
[6] University of New Hampshire, Institute for the Study of Earth, Oceans and Space, Durham NH 03824, USA
[3,10] Astrophysics Division, Space Science Department of ESA/ESTEC, NL-2200 AG Noordwijk, The Netherlands
[7] NASA/Goddard Space Flight Center, Greenbelt, MD 20771, USA
[1] Laboratory of Cosmic Ray and High Energy Astrophysics, Institute of High Energy Physics, P.O.Box 918-3, Beijing 100039, China
[9] Landessternwarte Heidelberg, Königstuhl, D-69117 Heidelberg, Germany

We report results of observations and analyses on the γ-ray blazar PKS 1622-297, with emphasis on the COMPTEL data (0.75 - 30 MeV) collected between April 1991 and November 1997. PKS 1622-297 was detected as a source of γ-rays by the EGRET experiment aboard CGRO in 1995 during a γ-ray outburst at energies above 100 MeV lasting for five weeks. In this time period the blazar was significantly ($\sim 5.9\ \sigma$) detected by COMPTEL at 10-30 MeV. At lower COMPTEL energies the detection is marginal, resulting in a hard MeV spectrum. The combined COMPTEL/EGRET energy spectrum shows a break at MeV energies. The broad-band spectrum (radio - γ-rays) shows that the γ-ray emission dominates the overall power output. On top of the 5-week γ-ray outburst, EGRET detected a huge flare lasting for > 1 day. Enhanced MeV emission (10 - 30 MeV) is found near the time of this flare, suggesting a possible time delay with respect to the emission above 100 MeV. Outside the 5-week flaring period in 1995, we do not detect MeV emission from PKS 1622-297.

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For preprints contact: shz@mpe.mpg.de, zhangs@astrosv1.ihep.ac.cn

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Transformation Properties of External Radiation Fields, Energy-Loss Rates and Scattered Spectra, and a Model for Blazar Variability

Charles D. Dermer[1], and Reinhard Schlickeiser[2]

[1] Naval Research Laboratory, Code 7653, Space Science Division, Washington, DC 20375-5352
[2] Institut für Theoretische Physik, Lehrstuhl IV: Weltraum- und Astrophysik, Ruhr-Universität Bochum, D-44780 Bochum, Germany

We treat transformation properties of external radiation fields in the proper frame of a plasma moving with constant speed. The specific spectral energy densities of external isotropic and accretion-disk radiation fields are derived in the comoving frame of relativistic outflows, such as those thought to be found near black-hole jet and gamma-ray burst sources. Nonthermal electrons and positrons Compton-scatter this radiation field, and high-energy protons and ions interact with this field through photomeson and photopair production. We revisit the problem of the Compton-scattered spectrum associated with an external accretion-disk radiation field, and clarify a past treatment by the authors. Simple expressions for energy-loss rates and Thomson-scattered spectra are given for ambient soft photon fields consisting either of a surrounding external isotropic monochromatic radiation field, or of an azimuthally symmetric, geometrically thin accretion-disk radiation field. A model for blazar emission is presented that displays a characteristic spectral and variability behavior due to the presence of a direct accretion-disk component. The disk component and distinct flaring behavior can be bright enough to be detected from flat spectrum radio quasars with *GLAST*. Spectral states of blazars are characterized by the relative importance of the accretion-disk and scattered radiation fields and, in the extended jet, by the accretion disk, inner jet, and cosmic microwave background radiation fields.

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Optical microvariability of EGRET blazars

Gustavo E. Romero[1], Sergio A. Cellone[2], Jorge A. Combi[1] and Ileana Andruchow[1]

[1] Instituto Argentino de Radioastronomía, C.C.5, (1894) Villa Elisa, Buenos Aires, Argentina
[2] Facultad de Ciencias Astronómicas y Geofísicas, UNLP, Paseo del Bosque, 1900 La Plata, Buenos Aires, Argentina

We present results of a photometric CCD study of the incidence of microvariability in the optical emission of a sample of 20 blazars detected at gamma-ray energies by the EGRET instrument of the Compton Gamma-Ray Observatory. We have observed strong outbursts in some sources, but many others displayed no significant variability on timescales of hours. The typical minimum timescale results to be of $\sim$ several hours, not tens of minutes as claimed by some authors. The duty cycle for optical intranight microvariations of gamma-ray blazars, as estimated from our observations, seems to be ~ 50 %, lower than what is usually assumed. For night-to-night variations, instead, the duty cycle approaches to what is observed in radio-selected BL Lacs and flat-spectrum radio quasars (i.e. ~ 70 %).

Accepted by A&A

For preprints contact: romero@iar.unlp.edu.ar *or* scellone@fcaglp.unlp.edu.ar

For preprints via ftp or WWW: http://arXiv.org/abs/astro-ph/0205311

Abstract Guidelines

Abstracts for "The Blazar Times" are solicited for papers that have been recently accepted for publication by a refereed journal, and for recent Ph.D. theses. Please do not submit an abstract before it has been accepted, nor after it is published. Abstracts from papers which are not refereed (e.g., conference proceedings) are not accepted.

The subject matter should pertain directly to the BL Lac and/or blazar phenomenon in general. Both observational and theoretical abstracts are appropriate. Abstracts from papers dealing with other classes of AGN will generally not be included unless they explicitly discuss their relevance to the blazar phenomenon; however exceptions to this rule will be considered.

A monthly call for abstracts will be issued and abstracts received by the last day of the month will usually appear in the following month's newsletter. Announcements of general interest to the BL Lac and blazar communities may also be submitted for posting in the newsletter. These might include (but are not restricted to) the following: (i) *Job Openings* directed toward blazar researchers, (ii) announcements of *Upcoming Meetings*, (iii) announcements of *Upcoming Observing Campaigns* for which participation is solicited from the community at large, (iv) reviews of *New Books*, and (v) *General Announcements* that provide or request research-related information.

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